55. (Amended) An apparatus as defined in claim 54, wherein said controller is configured to control the amount of light energy being emitted by said at least one tuning device independently of said light energy sources.

REMARKS

In the Office Action of November 20, 2001, claims 48 and 55 were objected for informalities. Applicants respectfully submit that the pending claims as amended correct the foregoing informalities and obviate those objections.

In the Office Action, the drawings were objected to under 37 C.F.R. §1.83(a). In the accompanying Request for Approval of Drawing Changes, the Applicants have proposed adding a directional arrow in Fig. 1 to more clearly illustrate a rotational direction of substrate holder 15. The Applicants submit that the minor drawing change is illustrative of the description found in the originally filed disclosure and does not add new matter. Therefore, the Applicants respectfully request the Examiner remove his objections to the drawings as amended.

Currently, claims 32-73 remain pending in the present application, including independent claims 32, 43, 51 and 60. All the claims are directed to an apparatus for heat treating semiconductor wafers. The apparatus includes a thermal processing chamber adapted to contain a semiconductor wafer and a heating device in communication with the thermal processing chamber. The heating device includes a plurality of light energy sources. In accordance with the present invention, the heating device further includes at least one tuning device positioned amongst the light energy sources that is designed to change the irradiance distribution of the light energy sources in a manner for more uniformly heating the semiconductor wafer.

In claim 32, the tuning device is a light energy source spaced from at least one optical element that includes a light refracting device. In claim 43, the tuning device is a laser diode. In

claim 51, the tuning device is a lamp device that is different from the plurality of light energy sources. Finally, in claim 60, the tuning device is a prismatic surface.

In the Office Action, independent claims 32 and 51 were rejected under 35 U.S.C. §102(b) as allegedly anticipated by Hauser et al., Lee et al., Moslehi et al. (U.S. Pat. No. 5,446,825), Moslehi et al. (U.S. Pat. No. 5,635,409), Chiba et al. and Moslehi, et al. (U.S. Patent No. 5,367,606) and were rejected under 35 U.S.C. § 102(e) as allegedly anticipated by Vosen (U.S. Pat. No. 5,930,456

Independent claims 43 and 60, on the other hand, were rejected under 35 U.S.C. § 103 in view of Vosen or '606 Moslehi.

In the Office Action, the Examiner invited the Applicants to overcome Vosen by affidavit or declaration under 37 C.F.R. § 1.131. To this end, the Applicants have included below a separately titled section containing a statement of common ownership of the present application and the Vosen patent.

The Applicants invite the Examiner's attention to the Office Gazette dated 26 December 2000. In pertinent part in Section 3, Page 2 of the Office Gazette, a modified policy is listed regarding evidence to establish common ownership or an obligation for assignment to the same person. Specifically, the policy states that applications and references including Patent Applications and Patents will be considered by the Examiner to be owned by or subject to an obligation of assignment to the same person at the time the invention was made if the Applicant or attorney or agent of record makes a statement to the effect that the application and the reference were, at the time the invention was made, owned by or subject to an obligation of assignment to the same person. Section 4 continues that the same person includes persons, organizations, or corporations.

The Office Gazette further explains that a statement concerning common ownership should be clear and conspicuous, e.g., on a separate piece of paper or in a separately labeled section, in order to ensure that the Examiner quickly notices the statement. Accordingly, the following separately labeled section is provided as a statement of common ownership to overcome Vosen.

Statement to Establish Common Ownership or Obligation for Assignment to the Same Person

U.S. Patent No. 5,930,456 to Vosen filed May 14, 1998 and issued July 27, 1999 was assigned to AG Associates of San Jose, California. The present application was filed January 6, 1999. AG Associates merged with Steag RTP Systems, Inc., to which the present application was initially assigned. Steag RTP Systems, Inc. then merged with Mattson Technology, Inc. Accordingly, the Vosen reference and the present application are commonly owned by Mattson Technology, Inc.

Based on the foregoing statement, the Applicants respectfully request that the Examiner remove any rejections under §103 that rely on Vosen. Further, it is respectfully submitted that all of the claims patentably define over Vosen under 35 U.S.C. §102. In particular, with respect to claims 32 and 51, Vosen fails to disclose a tuning device that includes a light energy source spaced from at least one optical element and fails to disclose a tuning device that comprises a lamp device that is different than a plurality of other lamp devices used to heat a wafer.

Applicants also respectfully submit that independent claims 32 and 51 are not anticipated by Moslehi '825, Moslehi '409, Moslehi '606, Hauser, or Lee.

Moslehi '825 is generally directed to a multi-zone illuminator module for directing optical energy into a semiconductor wafer. By way of example, Moslehi '825 discloses a three-zone configuration comprising center lamp zone 190, middle or intermediate zone 192, and outer

zone 194, which comprise a quantity of twelve (12) and twenty-four (24) lamps, respectively. (See col. 10, lines 19-24 and Fig. 14). The cited reference distinctly points out that an essential aspect is the formation of the concentric rings of optical sources using individual point source lamps. (See col. 11, lines 35-37). Therefore, Moslehi '825 is directed to controlling the lamps in the circular zones 190, 192, 194 or 270, 262, 266, 264 as stated in the '825 Abstract.

Evident from the foregoing, Moslehi '825 fails to disclose the use of a tuning device in addition to a plurality of light energy sources such as lamps found in zones 190, 192, and 194. As such, the cited reference fails to anticipate the invention defined in claims 32 and 51.

For instance, the Moslehi '825 patent as discussed fails to disclose or suggest that one of a plurality of point source lamps 196, for example, as shown in Fig. 14, is different than the remainder of the plurality of point source lamps 196 as required in claim 51. Stated alternatively, the point source lamps 196 of the cited reference are used together, not independent of each other, in zone arrangements such as the three-zone and four-zone described in detail in cols. 10 and 11 of the cited reference. These zone arrangements, moreover, are taught to be connected to one power supply such that they act in concert to provide a continuous photon radiation ring at the semiconductor wafer surface. Additionally, the multiple point source lamps are connected and act in concert so as to be more economical and practical. (See col. 11, lines 35-49). Thus, the cited reference not only fails to disclose a tuning device positioned among the point source lamps as a separate and different tuning device but Moslehi '825 teaches away from such a configuration.

Further, Moslehi '825 fails to disclose or teach a tuning device that includes a light energy source spaced from at least one optical element comprising a light refracting device as required in claim 32. As such, it is believed that claim 32 also patentably defines over Moslehi '825.

Moslehi '409, like the Moslehi '825 reference, is generally directed to a multi-zone illuminator module for directing optical energy into a semiconductor wafer. Also, like the '825 reference, the '409 reference does not disclose the use of tuning devices for more uniform heating of semiconductor elements. The '409 reference claims a method for real time multi-point semiconductor temperature and process uniformity control. The method claims of the '409 reference include performing temperature measurements and controlling the temperature of a semiconductor wafer by directing and reflecting optical energy into a plurality of concentric circular zones. (See, e.g., Claim 1, col. 18, lines 16-33). Stated alternatively, the Moslehi '409 is directed generally to providing temperature sensors such as FB2, FB3, and FB4 to a control computer 150, the control computer signaling power supplies such as PS1286, PS2288, etc. to adjust electrical power to the multiple zone lamp 130. See cols. 15, lines 64-67 and col. 16, lines 1-6. For example, the '409 patent uses the apparatus configuration as in the '825 patent (compare Fig. 14 of the '825 patent with Fig. 14 of the '409 patent) to adjust the temperature in a multi-zone configuration. However, the '409 patent, like the '825 patent, does not disclose a tuning device positioned among light energy sources as presently claimed.

More particularly, Moslehi '409 does not disclose a tuning device that comprises a light energy source spaced from at least one optical element comprising a light refracting device and does not disclose a tuning device positioned among a plurality of light energy sources where the tuning device comprises a second lamp device different from a first lamp device of the plurality of light energy sources. As such, it is believed that claims 32 and 51 also patentably define over Moslehi '409.

The Applicants also respectfully traverse the rejection of independent claims 32 and 51 as allegedly anticipated by Moslehi (U.S. Patent No. 5,367,606; hereinafter Moslehi '606) under 35 U.S.C. § 102(b). In pertinent part, Moslehi '606 includes a preferred embodiment which has a

multi-zone illuminator 130 and a series of open spaces or tubes through which an array of heating lamps 220 and dummy lamps 222 protrude. (See col. 4, lines 66-67 and col. 5, lines 1-2). Dummy lamps 222 are identical to lamps 220 according to the cited reference except that the dummy lamps 222 are placed in housing 200 such that their output radiation is isolated from a wafer 60. The purpose of the dummy lamps is to measure light modulation depth for the purpose of temperature measurement. (See col. 6, lines 49-57). The process control computer 150 as cited by the Examiner in col. 4, lines 17-32 provides multiple temperature control signals for real time semi-conductor wafer 60 temperature measurements.

Moslehi '606, however, fails to disclose a tuning device comprising a light energy source spaced from at least one optical element comprising a light refracting device as required in claim 32 and fails to disclose a tuning device positioned amongst a plurality of light energy sources in which the tuning device is a lamp device that is different from the lamp devices of the plurality of light energy sources as required in claim 51. Thus, it is respectfully submitted that claims 32 and 51 patently define over Moslehi '606.

Furthermore, Chiba, Lee and Hauser also all fail to disclose and anticipate the apparatus for heat treating semiconductor wafers defined in claim 32 or in claim 51. Similar to the Moslehi references, Chiba, Lee and Hauser also fail to disclose a tuning device that comprises a light energy source spaced from at least one optical element comprising a light refracting device as particularly defined in claim 32. The three references also fail to disclose a tuning device positioned amongst a plurality of light energy sources wherein the tuning device comprises a lamp device that is different than a first lamp device of the plurality of light energy sources. As such, it is believed that claims 32 and 51 further patentably define over Chiba, Lee and Hauser.

In the Office Action, independent claims 43 and 60 were also rejected under 35 U.S.C. §103 in view of '606 Moslehi. As conceded in the Office Action, the cited reference does not

disclose a prismatic surface as recited in claim 60. Moreover, the Examiner acknowledges that the '606 reference does not disclose a holder for rotating a wafer as recited in present claims 33, 44, 52 and 61; a focusing lens as recited in claims 34 and 37; a tiltable lever arm as recited in claims 36, 38, and 63; a laser diode as recited in claims 43 and 58; a fixed pitch and fixed facet angle as recited in claim 64; a fixed pitch and variable facet angle as recited in claim 65; a ruled prismatic surface as recited in claim 69; a high reflective material having a reflectivity of at least 0.9 as recited in claim 72; and a diffuse surface as recited in claim 73.

By way of example regarding independent claim 60, the Applicants respectfully submit that it would not have been obvious to one skilled in the art to have remedied the deficiencies of the '606 patent by adding at least a prismatic surface as recited in the claim. The Examiner states that use of a prismatic surface is considered to be obvious in variation and design since the prismatic surface is well know in the art and thus it would have been obvious to one skilled in the art to use the prismatic surface of the present invention. However, the Examiner does not cite prior art showing that the use of the claimed material is known to be suitable for such purpose. In re Zurko, 258 F.3d 1379, 1386, 59 U.S.P.Q.2d 1693, 1697 (Fed. Cir. 2001) (stating that in patentability determinations limitations of claimed inventions cannot be met with general conclusions about 'basic knowledge' or 'common sense' to one of ordinary skill in the art, but must be found in concrete evidence of record). See also In re Sang Su Lee, -- F.3d -- , -- U.S.P.Q. 2d -- (Fed. Cir. 2002)(stating that the determination of patentability on the ground of obviousness requires the Examiner to articulate and place on the record that which he relies on to assert to be general knowledge to negate patentability). Therefore, Applicants respectfully submit that one of ordinary skill, when presented with the cited reference, could only have rectified the deficiencies of Moslehi '606 with the impermissible use of hindsight afforded by the

present disclosure. Accordingly, Applicants respectfully request that the Examiner remove his rejections to independent claims 43 and 60 and all claims dependent thereon.

In view of the foregoing discussion, Applicants respectfully request reconsideration and re-examination of the pending application and the timely allowance of pending claims 32-73. Applicants respectfully submit that the claims are patentably distinctive over the prior art of record. Applicants believe that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested.

Examiner Nguyen is invited and encouraged to telephone the undersigned should any issues remain after consideration of this response.

Please charge any additional fees to deposit account No. 04-1403.

Respectfully submitted,

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April 22, 2002
Date

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48. (Amended) An apparatus as defined in claim 47, [where in]wherein said controller is configured to control the amount of light energy being emitted by said at least one tuning device independently of said light energy sources.

55. (Amended) An apparatus as defined in claim 54, [where in]wherein said controller is configured to control the amount of light energy being emitted by said at least one tuning device independently of said light energy sources.